

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 06 June 2001 (06.06.01)	
International application No. PCT/KR00/01070	Applicant's or agent's file reference HTP0500/PCT
International filing date (day/month/year) 26 September 2000 (26.09.00)	Priority date (day/month/year) 30 September 1999 (30.09.99)
Applicant LIM, Jeong, Ok et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 19 April 2001 (19.04.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Olivia TEFY Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

HONG, Jae, II
7th FL HanjoongAng BLDG, #646-7
Yoksam-dong, Kangnam-ku
Seoul 135-080
RÉPUBLIQUE DE CORÉE

Date of mailing (day/month/year) 21 August 2001 (21.08.01)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference HTP0500/PCT	
International application No. PCT/KR00/01070	International filing date (day/month/year) 26 September 2000 (26.09.00)

1. The following indications appeared on record concerning:

☐ the applicant ☐ the inventor ☒ the agent ☐ the common representative

Name and Address

HONG, Jae, II
The Second Floor Halla Classic
Building, 824-11
Yoksam-dong, Kangnam-ku
Seoul 135-080
Republic of Korea

State of Nationality

State of Residence

Telephone No.

82-2-566-0002

Facsimile No.

82-2-558-5558

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence

Name and Address

HONG, Jae, II
7th FL HanjoongAng BLDG, #646-7
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Seoul 135-080
Republic of Korea

State of Nationality

State of Residence

Telephone No.

82-2-566-0002

Facsimile No.

82-2-558-5558

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

BRITEL Idhir

Facsimile No.: (41-22) 740.14.35

Telephone No.: (41-22) 338.83.38

COPY FOR IB

PATENT COOPERATION TREATY

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REC'D 30 JAN 2002

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

12

Applicant's or agent's file reference HTP0500/PCT	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/KR00/01070	International filing date (day/month/year) 26 SEPTEMBER 2000 (26.09.2000)	Priority date (day/month/year) 30 SEPTEMBER 1999 (30.09.1999)
International Patent Classification (IPC) or national classification and IPC IPC7 D06M 11/83		
Applicant HUH, Jeung Soo et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of <u>3</u> sheets, including this cover sheet. <input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). These annexes consist of a total of _____ sheets.
3. This report contains indications relating to the following items: I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application

Date of submission of the demand 19 APRIL 2001 (19.04.2001)	Date of completion of this report 18 JANUARY 2002 (18.01.2002)
Name and mailing address of the IPEA/KR Korean Intellectual Property Office Government Complex-Daejeon, 920 Dunsan-dong, Seo-gu, Daejeon Metropolitan City 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer PARK, Hwa Gyu Telephone No. 82-42-481-5997



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/KR00/01070

I. Basis of the report

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed
- ☐ the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement) under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheet _____

5. ☐ This opinion has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed." and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/KR00/01070

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1	YES
	Claims		NO
Inventive step (IS)	Claims	1	YES
	Claims		NO
Industrial applicability (IA)	Claims	1	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The claimed invention is not considered to be anticipated by the patent documents cited. None of these documents reveal a heating pad using an electrically conducting polymer, as described in the claim.

The invention according to claim 1 is, therefore, considered new, inventive and industrially applicable.

The patent documents cited are as follows:

KR 2000-59546 A (LIM, JEONG OK)

US 4527566 A (ABARE ENTERPRISE. Inc)

US 4788417 A (KANTHAL MEDICAL HEATING AB.)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
5 April 2001 (05.04.2001)

PCT

(10) International Publication Number
WO 01/23659 A1

(51) International Patent Classification⁷: **D06M 11/83**

[KR/KR]; 105-1102 Hyp-Hwa mansion, Chisan-dong, Susung-gu, Taegu 706-090 (KR).

(21) International Application Number: **PCT/KR00/01070**

(22) International Filing Date:
26 September 2000 (26.09.2000)

(74) Agent: **HONG, Jae, Il**; The Second Floor Halla Classic Building, 824-11, Yoksam-dong, Kangnam-ku, Seoul 135-080 (KR).

(25) Filing Language: **English**

(26) Publication Language: **English**

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(30) Priority Data:
1999/41954 30 September 1999 (30.09.1999) **KR**

(71) Applicants (*for all designated States except US*): **HUH, Jeung, Soo** [KR/KR]; 106-405 Dong-A Apt, Chimsan 3-dong, Buk-gu, Taegu 702-053 (KR). **BAEK, Woon, Yi** [KR/KR]; 305-2002 Four Season Apt, Daegok-dong, Dalseo-gu, Taegu 704-310 (KR). **KIM, Jin, Do** [KR/KR]; 106-2002 Sungkwang Woobang Apt, Chilsung 2-ga, Buk-gu, Taegu 702-062 (KR).

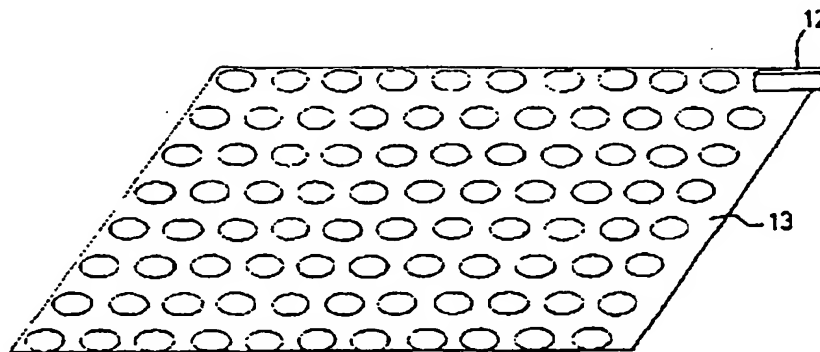
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

(72) Inventors; and
(75) Inventors/Applicants (*for US only*): **LIM, Jeong, Ok** [KR/KR]; 106-405 Dong-A Apt, Chimsan 3-dong, Buk-gu, Taegu 702-053 (KR). **PARK, Dong, Won**

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR MANUFACTURING HEATING PAD USING ELECTRICALLY CONDUCTING POLYMER SUITABLE FOR USE IN MAINTAINING PATIENTS' BODY TEMPERATURE



(57) Abstract: Disclosed is a method for manufacturing a heating pad using an electrically conducting polymer suitable for use in maintaining patient' body temperatures. A cloth made of a synthetic fiber or a natural fiber is treated in a bath containing dopants, distilled polymerizable monomers, and an oxidizer under such a high temperature and pressure that an electrically conducting polymer is chemically formed on the cloth. After being washed, the cloth is covered with a patterning sheet such that electrical polymerization is conducted to grow a polymeric coating according to the pattern of the patterning sheet. The heating pad has a resistance of 10^2 - $10^2 \Omega$ /. To the heating pad, a temperature sensor and controller is provided for safely maintaining patient' body temperatures.

WO 01/23659 A1

METHOD FOR MANUFACTURING HEATING PAD USING
ELECTRICALLY CONDUCTING POLYMER SUITABLE FOR USE IN
MAINTAINING PATIENTS' BODY TEMPERATURE

TECHNICAL FIELD

5 The present invention relates to a method for manufacturing a heating pad suitable for use in maintaining patients' body temperatures. More particularly, the present invention relates to the coating of an electrically conducting material, such as polypyrrole, polyaniline, or polythiophene, on a cloth in a chemical and an
10 electrical polymerization process, so as to manufacture a heating pad which can safely maintain its temperature at at least at $40\pm 5^{\circ}\text{C}$ for 1-4 hours.

PRIOR ART

Since most of the hospital buildings that have recently been constructed or remodeled adopt centrally controlled heating and cooling systems, it is virtually
15 impossible to regulate ward temperatures to accommodate every patient who is admitted to the hospitals. Thus, patients, who usually live in thin gowns for a long period of time in hospitals, are required to control and manage their own individual body temperatures. In particular, the patients who have just undergone surgical operations have difficulty in controlling their own body temperatures
20 because of the stress and bleeding resulting from the operations and the exposure of internal organs to the outside for a long period of time. In fact, since the interior temperatures of hospitals are usually maintained at $22-24^{\circ}\text{C}$ all the year round, the patients on whom operations have just been performed cannot recover their normal body temperature immediately so that they may suffer from shivering
25 and hypoxia.

To prevent such problems which lead the patients to suffer serious consequences, a hypothermic control system or a warming air inflation blanket is typically employed for use in maintaining the body temperature of the patients

who have just undergone operations. Associated with a main body as large as an average washing machine, a hypothermic control system, in which warm water is circulated through a rubber mattress, is limitedly used. In addition, it is very expensive. As for the warming air inflation blanket, its function of warming patients is performed with warm air which is injected between double-sided covers. In addition to being expensive, this blanket, however, causes an environmental problem because it is disposable. Further, it is unpleasant to the touch because it is made of vinyl and non-woven fabrics. Swelling as warm air is injected, the blanket is inconvenient to cover patients with. Meanwhile, an electric blanket, which is extensively used for maintaining warmth, is prohibited from being used in hospitals because the electromagnetic waves generated during its operation may harm the patient and interfere with the operations of precision instruments in operating rooms, directly and indirectly. Furthermore, there is always the danger that the patient might receive an electric shock from the blanket because of the presence of water, such as physiological saline and blood, near the patient. Moreover, the patient may catch fire if the controller of the electric blanket is out of the order.

DISCLOSURE OF THE INVENTION

It is an object of the present invention to overcome the above problems encountered in prior arts and to provide a method for manufacturing a heating pad which can safely generate heat by taking advantage of the heating properties of an electrically conducting polymer.

Based on the present invention, the above object could be accomplished by a provision of a method for manufacturing a heating pad using an electrically conducting polymer suitable for use in maintaining patients' body temperatures, comprising: a chemical polymerization process in which a cloth is treated with a solution containing dopants, distilled polymerizable monomers and an oxidizer at a high temperature under a high pressure to coat an electrically conducting polymer membrane onto the cloth, said cloth being composed of synthetic fibers such as

nylon or polyester, or a combination of synthetic fibers and natural fibers; an electrical polymerization process in which the cloth is washed with water to detach weakly bonded polymeric materials therefrom and covered with a magnetic patterning sheet such that a polymeric coating is allowed to grow thicker on the exposed areas of the cloth; and an instrumenting process in which a temperature sensor and controller and a portable power supply are provided to the cloth.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a schematic view illustrating a high temperature and pressure system for use in the chemical polymerization of electrically conducting monomers in accordance with an embodiment of the present invention;

Fig. 2 is a schematic view illustrating a polymerization bath system for use in the electrical polymerization process in accordance with another embodiment of the present invention;

Fig. 3 is a side view showing a magnetic patterning sheet in accordance with a further embodiment of the present invention;

Fig. 4 is a schematic view illustrating a heating pad equipped with a temperature sensor and controller and a power supply;

Fig. 5 shows a temperature profile and a current profile of the heating pad, both of which are plotted with regard to time; and

Fig. 6 shows various applications of the heating pad.

BEST MODES FOR CARRYING OUT THE INVENTION

The present invention is essentially composed of a chemical polymerization process for coating an electrically conducting polymer membrane

on a gray cloth and an electrical polymerization process for growing a polymer membrane with the aid of a magnetic patterning sheet.

In the chemical polymerization process, the electrically conducting polymer membrane is formed at about 50-150 °C under a pressure of 1-3 kgf/cm² by immersing a gray cloth in a bath containing dopants, polymerizable monomers, and an oxidizer. Suitable as the gray cloth is a synthetic fiber, such as a nylon fiber or a polyester fiber. In this process, an electrical current is passed through the cloth, so that it is used as an electrode in the electrical polymerization process.

The electrical polymerization process is conducted by applying the electrode with a current density of 1-9 mA/cm² while N₂ gas is bubbled for stirring in a polymerization bath.

In order to provide the cloth with flexibility and an efficient heating structure, a pattern of a polymeric coating is formed on the cloth. In this regard, the cloth is covered with the magnetic patterning sheet such that a polymer is allowed to grow thicker on the exposed areas of the cloth. Suitable for use as the polymeric material in the present invention are polypyrrole, polyaniline and polythiophene, all of which are electrically conductive. One or more of these electrically conductive polymers are coated by using a chemical and an electrical polymerization process in combination. A portable battery can be equipped on the heating pad to heat the heating pad to 40-45 °C. Also, a temperature sensor and controller is provided for controlling the temperature of the heating pad at below 45 °C because the skin is burned if it is exposed to higher 45 °C for 1 hour or longer. Thus, the heating pad can be used safely.

A better understanding of the present invention may be obtained in light of the following examples which are illustrated with reference to the accompanying drawings and set forth to illustrate, but are not to be construed to limit the present invention.

EXAMPLE 1

With reference to Fig. 1, there is a high-temperature, high-pressure system 3 in which chemical polymerization is conducted in accordance with an embodiment of the present invention. As illustrated in Fig. 1, a cloth 1, which is used as a substrate for the heating pad of the present invention, is repeatedly
5 through a bath 2 containing dopants, distilled polymerizable monomers and an oxidizer while a chemical polymerization reaction occurs in the bath 2. To facilitate the chemical polymerization, the bath 2 is heated by a heater 4. During the chemical polymerization, the system 3 is maintained at about 50-150 °C under a pressure of 1-3 kgf/cm² for 3-100 min. The reason why such high temperature
10 and pressure conditions are adopted is that, as in a dyeing process, the electrically conducting polymers obtained are forced to more actively impregnate into the cloth fibers under the high temperature and pressure conditions than under ordinary temperature and pressure conditions. Most of the polymers formed by the chemical polymerization stick to the cloth fibers via physical forces. After
15 completion of the chemical polymerization, the cloth 1 is washed with water to detach the polymers which are weakly associated with the cloth 1. Afterward, the cloth is dried at room temperature or in an oven to give an electrically conducting polymer-impregnated cloth 1'.

EXAMPLE 2

20 With reference to Fig. 2, a polymerization bath system is provided for electrical polymerization according to another embodiment of the present invention. In the polymerization bath system, the cloth 1', which is obtained in Example 1, is allowed to undergo electrical polymerization. In this regard, the working electrode is applied with a current density of 1-9 mA/cm² while the bath
25 is bubbled from its bottom with N₂ gas for stirring. The cloth is subjected to patterning with the aid of a magnet to increase the amount of electrically conducting polymeric materials which are coated onto the cloth and to improve the quality of the coating. To achieve a preferred patterning result, the rotating speed of rollers 5 may be adjusted. Because the ions present in the polymerization bath

are positively charged, when an N pole, which is cathode, faces to an opposing electrode 7, the cations in the polymerization bath are attracted toward the working electrode under the influence of the magnetic field formed, such that the cations coat onto the cloth which closely contacts the working electrode. As a result, the cloth is found to be improved in surface morphology as observed with a microscope. In addition, the cloth 1' is has a surface resistance of approximately $10 \Omega/\square$, which is lower than that of the cloth which is obtained by electrical polymerization using a patterning sheet.

EXAMPLE 3

Referring to Fig. 3, there is shown a patterning sheet 6 in a side view, with which a pattern is formed on the cloth upon the electrical polymerization, in accordance with another embodiment of the present invention. The patterning is for the purpose of providing the cloth with flexibility. In this connection, a magnetic patterning sheet like that shown in Fig. 3 is covered over the cloth so that a polymeric coating is allowed to grow thicker on the exposed areas of the cloth. Thus, the rollers are quickly rotated whenever the cloth passes through patterning parts 9. Once the passing of the cloth is completed, electrical polymerization is achieved, giving a pattern after the patterning sheet 6. Because a larger number of cations of the polymerization bath are attracted toward the N poles which are negatively charged, a larger amount of electrically conducting polymer materials are coated on the areas near the N poles.

EXAMPLE 4

With reference to Fig. 4, there is a heating pad 13 equipped with a temperature sensor, a temperature controller and a power supply 8, which is manufactured in accordance with the present invention. When prepared only through chemical polymerization, the cloth is found to range in resistance from approximately 10^0 to $10^2 K\Omega/\square$. However, the coated areas of the cloth which are

patterned with the aid of the patterning sheet are measured to have a resistance of approximately 10^{-2} to $10^2 \Omega/\square$. Therefore, electrical paths on the heating pad are formed along the trace of the patterned parts 10 which are used for the electrical polymerization. Complying with the Joule heating, the calorific power of the heating pad is represented by the following formula: $Q = 0.24 I^2 R t$ (cal). Depending on the materials, the temperature of the heating pad increases according to the following formula: $Q = C_m m \Delta T$ wherein C_m represents heat capacity and m represents a mass.

EXAMPLE 5

With reference to Fig. 5, there is a temperature profile of a heating pad manufactured in accordance with the present invention, which is plotted with regard to a period of time, along with a current profile provided to the heating pad. To obtain the temperature profile, a 12 V lithium ion battery was mounted on the heating pad which was then tested for heating. As shown in the temperature profile, the heating pad is heated to above 40°C shortly after the supply of power from the battery and is maintained at more than 40°C for 8 hours or longer.

INDUSTRIAL APPLICABILITY

As described hereinbefore, a heating pad can be manufactured by coating a cloth with an electrically conducting polymeric material which generates no generating electromagnetic wavelengths harmful to the body in a combination of a chemical and an electrical polymerization process. To the heating pad, a portable power supply is provided for generating heat and a temperature sensor and controller for controlling the temperature.

Although the heating pad of the present invention has been described for use in maintaining patients' body temperatures, it will be understood that the teachings herein can be applied to various products as well, including grooves, dresses, shoes, tents, etc., as shown in Fig. 6.

While the foregoing examples illustrate and describe the use of the present invention, they are not intended to limit the present invention as disclosed in certain preferred embodiments herein. Therefore, variations and modifications commensurate with the above teachings and the skill and/or knowledge of the relevant art, are within the scope of the present invention.

CLAIM

1. A method for manufacturing a heating pad using an electrically conducting polymer suitable for use in maintaining patients' body temperatures, comprising:

5 a chemical polymerization process in which a cloth is treated with a solution containing dopants, distilled polymerizable monomers and an oxidizer at a high temperature under a high pressure to coat an electrically conducting polymer membrane onto the cloth, said cloth being composed of synthetic fibers such as nylon or polyester, or a combination of synthetic fibers and natural fibers;

10 an electrical polymerization process in which the cloth is washed with water to detach weakly bonded polymeric materials therefrom and covered with a magnetic patterning sheet such that a polymeric coating is allowed to grow thicker on the exposed areas of the cloth; and

15 an instrumenting process in which a temperature sensor and controller and a portable power supply are provided to the cloth.

FIG 1.

1/4

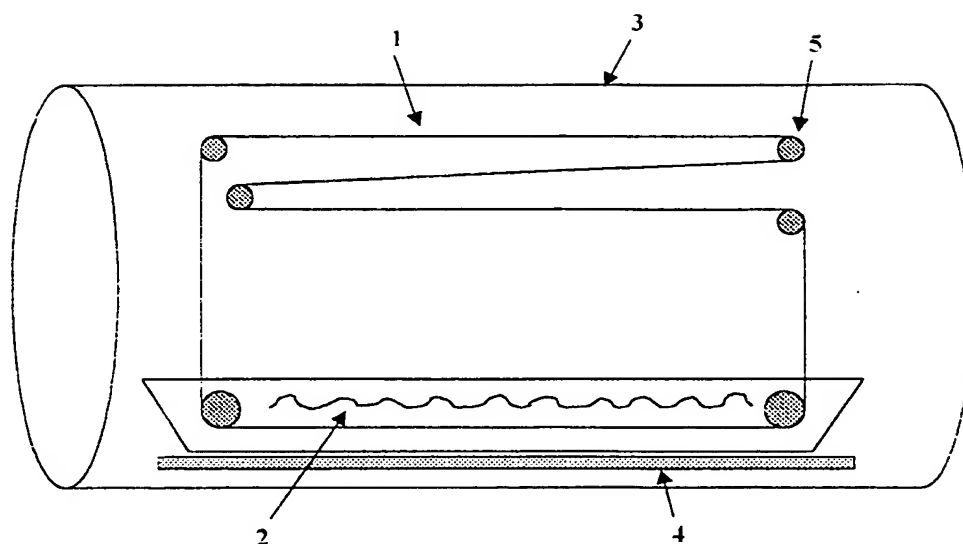


FIG 2.

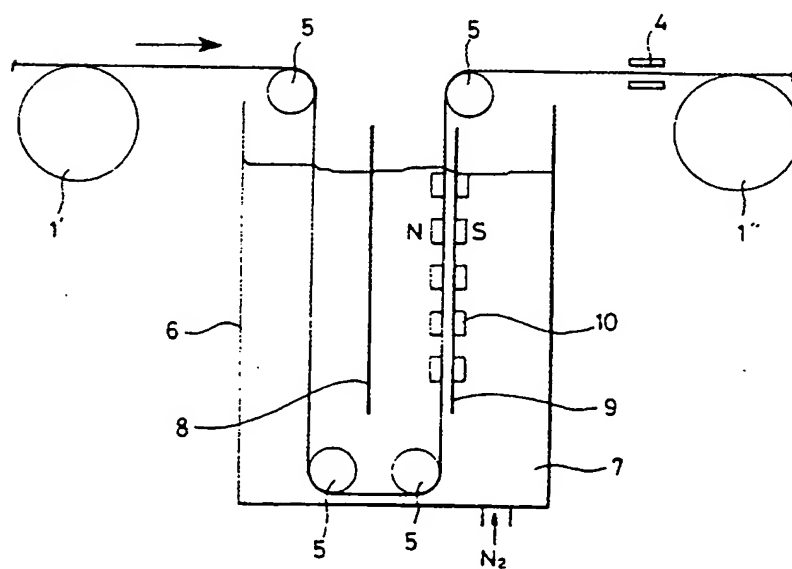


FIG 3.

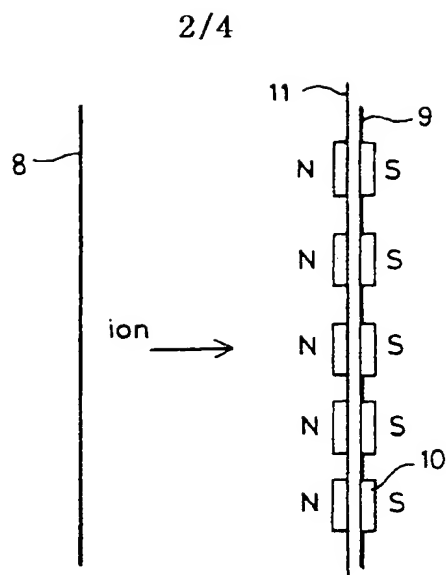


FIG 4.

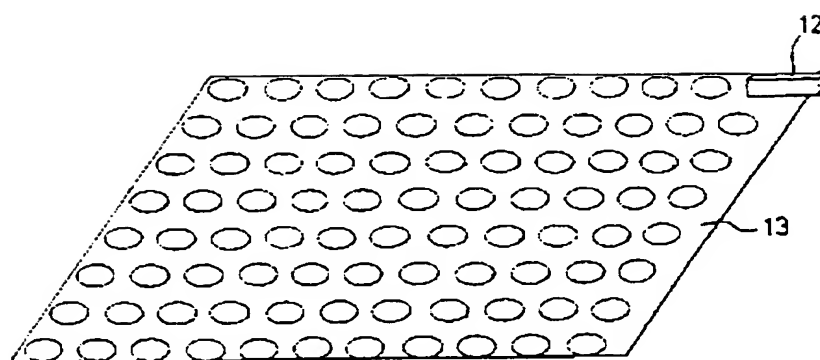


FIG 5.

3/4

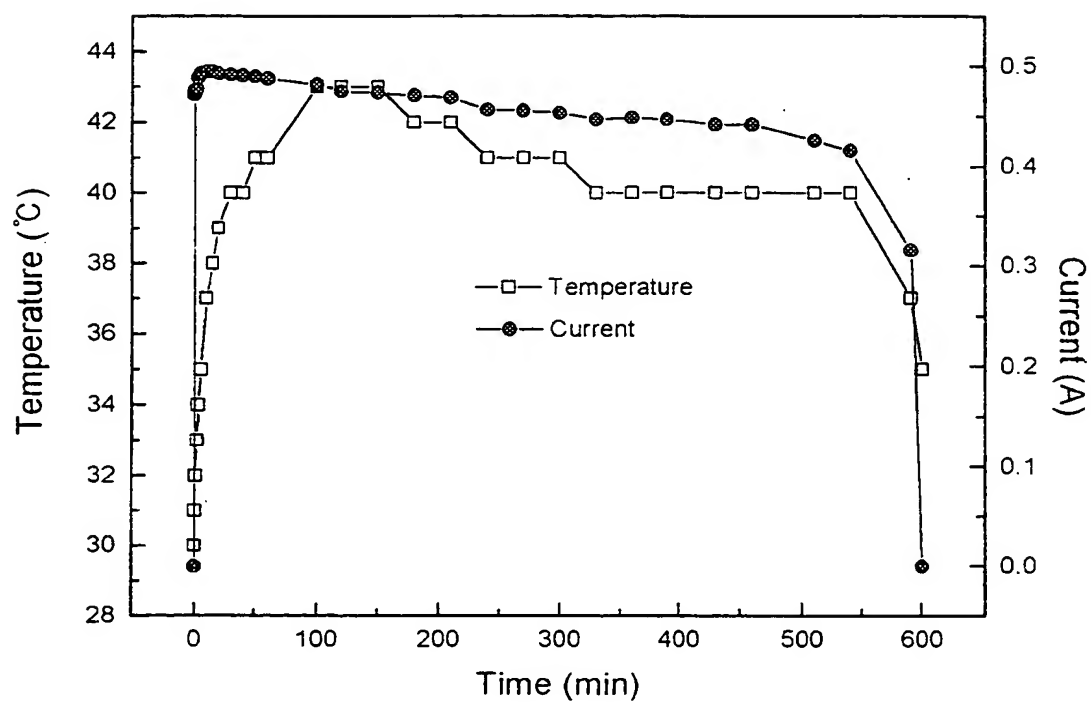
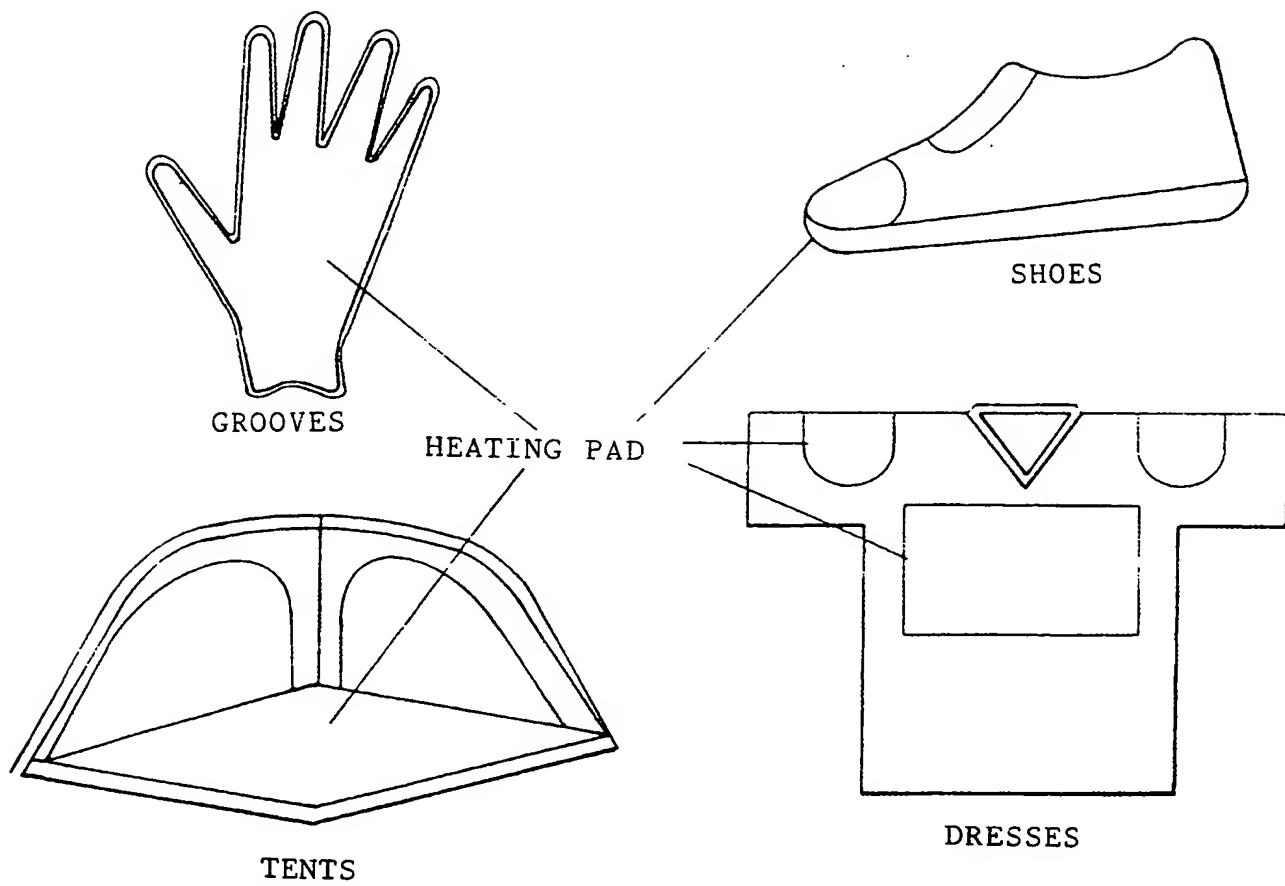


FIG 6.

4/4



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR00/01070

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 D06M 11/83

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 D06M 11/83, A61F 13/06, H05B 3/34

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

KR IPC as above

JP IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	KR, A, 2000-59546 (LIM, JEONG OK) 5 October 2000 (05. 10. 2000) see the whole document	1. (Family none)
A	US, A, 4527566 (ABARE ENTERPRISE, Inc) 9 July 1985 (09. 07. 85) see the whole document	1. (Family none)
A	US, A, 4788417 (KANTHAL MEDICAL HEATING AB.) 29. November 1988 (29. 11. 88) see the whole document	1. (Family none)

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

15 JANUARY 2001 (15.01.2001)

Date of mailing of the international search report

16 JANUARY 2001 (16.01.2001)

Name and mailing address of the ISA/KR

Korean Industrial Property Office
Government Complex-Taejon, Dunsan-dong, So-ku, Taejon
Metropolitan City 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

CHO, Jeong Han

Telephone No. 82-42-481-5583



PCT REQUEST

Original (for SUBMISSION) - printed on 26.09.2000 02:05:42 PM

0	For receiving Office use only	
0-1	International Application No.	
0-2	International Filing Date	
0-3	Name of receiving Office and "PCT International Application"	
0-4	Form - PCT/RO/101 PCT Request	
0-4-1	Prepared using	PCT-EASY Version 2.91 (updated 01.07.2000)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	Korean Industrial Property Office (RO/KR)
0-7	Applicant's or agent's file reference	HTP0500/PCT
I	Title of invention	METHOD FOR MANUFACTURING HEATING PAD USING ELECTRICALLY CONDUCTING POLYMER SUITABLE FOR USE IN MAINTAINING PATIENTS' BODY TEMPERATURE
II	Applicant	
II-1	This person is:	applicant only
II-2	Applicant for	all designated States except US
II-4	Name (LAST, First)	HUH, Jeung Soo
II-5	Address:	106-405 Dong-A Apt Chimsan 3-dong, Buk-gu 702-053 Taegu Republic of Korea
II-6	State of nationality	KR
II-7	State of residence	KR
II-8	Telephone No.	82-53-420-5447
III-1	Applicant and/or inventor	
III-1-1	This person is:	applicant and inventor
III-1-2	Applicant for	US only
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III-1-6	State of nationality	KR
III-1-7	State of residence	KR

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III-2	Applicant and/or inventor	
III-2-1	This person is:	applicant only
III-2-2	Applicant for	all designated States except US
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III-2-6	State of nationality	KR
III-2-7	State of residence	KR
III-3	Applicant and/or inventor	
III-3-1	This person is:	applicant and inventor
III-3-2	Applicant for	US only
III-3-4	Name (LAST, First)	PARK, Dong Won
III-3-5	Address:	105-1102 Hyp-Hwa mansion Chisan-dong, Susung-gu 706-090 Taegu Republic of Korea
III-3-6	State of nationality	KR
III-3-7	State of residence	KR
III-4	Applicant and/or inventor	
III-4-1	This person is:	applicant only
III-4-2	Applicant for	all designated States except US
III-4-4	Name (LAST, First)	KIM, Jin Do
III-4-5	Address:	106-2002 Sungkwang Woobang Apt Chilsung 2-ga, Buk-gu 702-062 Taegu Republic of Korea
III-4-6	State of nationality	KR
III-4-7	State of residence	KR
IV-1	Agent or common representative; or address for correspondence	
	The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name (LAST, First)	HONG, Jae Il
IV-1-2	Address:	The Second Floor Halla Classic Building, 824-11 Yoksam-dong, Kangnam-ku 135-080 Seoul Republic of Korea
IV-1-3	Telephone No.	82-2-566-0002
IV-1-4	Facsimile No.	82-2-558-5558
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V V-1	Designation of States Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	<p>AP: GH GM KE LS MW MZ SD SL SZ TZ UG ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT</p> <p>EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT</p> <p>EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE and any other State which is a Contracting State of the European Patent Convention and of the PCT</p> <p>OA: BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT</p>
V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	<p>AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH&LI CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW</p>
V-5	Precautionary Designation Statement In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.	
V-6	Exclusion(s) from precautionary designations	NONE
VI-1	Priority claim of earlier national application	
VI-1-1	Filing date	30 September 1999 (30.09.1999)
VI-1-2	Number	1999-41954
VI-1-3	Country	KR
VI-2	Priority document request The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1

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VII-1	International Searching Authority Chosen	Korean Industrial Property Office (KIPO) (ISA/KR)	
VIII	Check list	number of sheets	electronic file(s) attached
VIII-1	Request	4	-
VIII-2	Description	8	-
VIII-3	Claims	1	-
VIII-4	Abstract	1	atstract0500.txt
VIII-5	Drawings	4	-
VIII-7	TOTAL	18	
VIII-8	Accompanying items	paper document(s) attached	electronic file(s) attached
VIII-8	Fee calculation sheet	✓	-
VIII-9	Separate signed power of attorney	✓	-
VIII-16	PCT-EASY diskette	-	diskette
VIII-18	Figure of the drawings which should accompany the abstract	4	
VIII-19	Language of filing of the international application	English	
IX-1	Signature of applicant or agent		
IX-1-1	Name (LAST, First)		
		HONG, Jae Il	

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10-1	Date of actual receipt of the purported international application	
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/KR
10-6	Transmittal of search copy delayed until search fee is paid	

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11-1	Date of receipt of the record copy by the International Bureau	
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